

EXERCISES

For more practice, see *Extra Practice*.

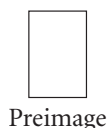
Practice and Problem Solving

A Practice by Example

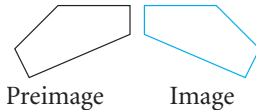
Example 1 (page 634)

State whether the transformation appears to be an isometry. Explain.

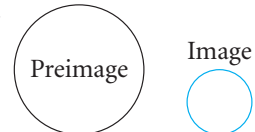
1.



2.



3.



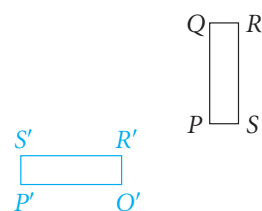
Example 2 (page 635)

In each diagram, the blue figure is an image of the black figure.

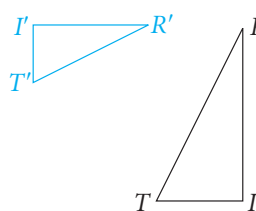
(a) Choose an angle or point from the preimage and name its image.

(b) List all pairs of corresponding sides.

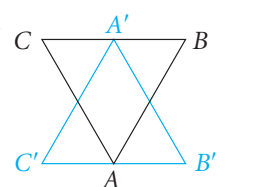
4.



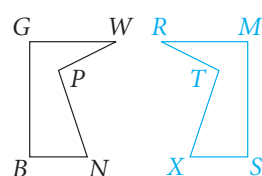
5.



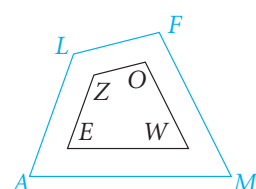
6.



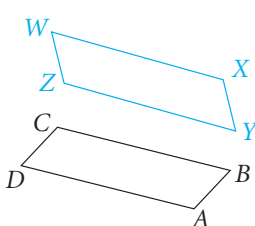
7.



8.



9.



Example 3 (page 636)

Coordinate Geometry Given points $J(1, 4)$, $A(3, 5)$, and $R(2, 1)$, draw $\triangle JAR$ and its reflection image in each line.

10. the x -axis

11. the y -axis

12. $y = 2$

13. $y = 5$

14. $x = -1$

15. $x = 2$

16. $y = -x$

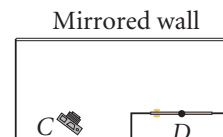
17. $y = x - 3$

Example 4 (page 636)

18. Trail Building A hiking club is building a new trail system. They want to build trails to the Overlook and Balance Rock that will connect at a point on Summit Trail. Working under a tight budget, they want to minimize the total length of these trails. If the trails cover similar terrain, at what point should they meet on Summit Trail?

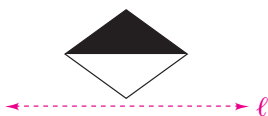


19. Security You are installing a security camera. At what point on the mirrored wall should you aim camera C in order to videotape door D ?



Copy each figure and line ℓ . Then draw each figure's reflection image in line ℓ .

20.

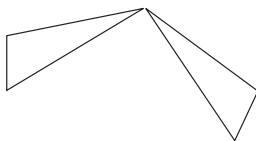


21.



Copy each pair of figures. Then draw the line of reflection you can use to map one figure onto the other.

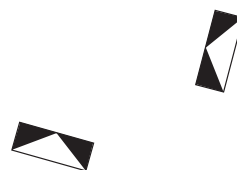
22.



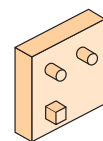
23.



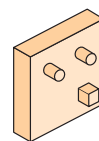
24.



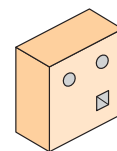
25. Pharmaceuticals Most drugs are made of two versions of the same molecule, each a mirror image of the other. One version is known as an *R-isomer* and the other as an *S-isomer*. While one isomer can



S-Isomer



R-Isomer



Receptor Molecule

help with what ails you, the other can create unwanted side effects. Models of two isomers are shown above. For this drug to cure an illness, it needs to fit into the “receptor molecule.” Which isomer will cure the illness?

26. Open-Ended Give three examples from everyday life of objects that come in a left-handed version and a right-handed version.

Coordinate Geometry A point is reflected in the given line. How are the coordinates of the point and its image related? Explain.

27. x -axis

28. y -axis

29. the line $y = x$



30. History The work of artist and scientist Leonardo da Vinci (1452–1519) has an unusual characteristic. His handwriting is a mirror image of normal handwriting.

- Write the mirror image of the sentence, “Leonardo da Vinci was left-handed.” Use a mirror to check how well you did.
- Explain why the fact about da Vinci in part (a) might have made mirror writing seem natural to him.

Write an equation for the image of the given circle after a reflection in line ℓ .

31. $x^2 + y^2 = 49$, ℓ : y -axis

32. $x^2 + y^2 = 4$, ℓ : $y = 2$

33. $(x - 2)^2 + (y + 3)^2 = 9$, ℓ : $x = 1$

34. $(x + 3)^2 + (y + 4)^2 = 16$, ℓ : x -axis

35. $x^2 + (y + 3)^2 = 36$, ℓ : $y = -3$

36. $(x + 1)^2 + (y - 5)^2 = 25$, ℓ : $y = x$

Find the image of $O(0, 0)$ after two reflections, first in ℓ_1 and then in ℓ_2 .

37. ℓ_1 : $y = 3$, ℓ_2 : x -axis

38. ℓ_1 : $x = -2$, ℓ_2 : y -axis

39. ℓ_1 : x -axis, ℓ_2 : y -axis

40. $\ell_1: x = -2, \ell_2: y = 3$ 41. $\ell_1: y = 3, \ell_2: x = -2$ 42. $\ell_1: x = -2, \ell_2: y = x$
 43. $\ell_1: x = a, \ell_2: y = b$ 44. $\ell_1: x = a, \ell_2: y = x$ 45. $\ell_1: y = b, \ell_2: y = x$
46. **Critical Thinking** Given that the transformation $\triangle ABC \rightarrow \triangle A'B'C'$ is an isometry, list everything you know about the two figures.



Challenge



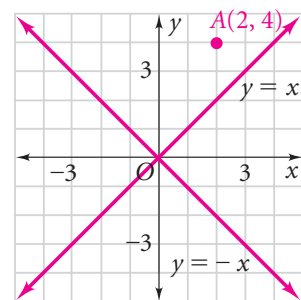
Writing Can the given type of quadrilateral be described in terms of reflections? Explain.

47. parallelogram 48. isosceles trapezoid 49. kite
 50. rhombus 51. rectangle 52. square

53. **Coordinate Geometry** Show that $B(b, a)$ is the reflection image of $A(a, b)$ in the line $y = x$. (Hint: Show that $y = x$ is the perpendicular bisector of \overline{AB} .)
 54. **Coordinate Geometry** Find the line of reflection that maps $A(a, b)$ to $C(c, d)$.

55. Use the diagram at the right. Find the coordinates of the given point in the given line.

- a. A' , the reflection image of A in the line $y = x$
 b. A'' , the reflection image of A' in the line $y = -x$
 c. A''' , the reflection image of A'' in the line $y = x$
 d. A'''' , the reflection image of A''' in the line $y = -x$
 e. How are A and A'''' related?



Standardized Test Prep

Multiple Choice

56. What is the reflection image of $(5, -3)$ in the y -axis?
 A. $(5, 3)$ B. $(-5, 3)$ C. $(-5, -3)$ D. $(-3, 5)$
57. What is the reflection image of $(5, -3)$ in the line $y = -x$?
 F. $(-3, 5)$ G. $(-3, -5)$ H. $(3, -5)$ I. $(3, 5)$

Quantitative Comparison

Compare the boxed quantity in Column A with the boxed quantity in Column B. Choose the best answer.

- A. The quantity in Column A is greater.
 B. The quantity in Column B is greater.
 C. The two quantities are equal.
 D. The relationship cannot be determined from the information given.

$(-7, -1)$ reflected in the x -axis has image (x_1, y_1) .
 $(-7, -1)$ reflected in the y -axis has image (x_2, y_2) .

Column A

Column B

58.	x_1	x_2
59.	y_1	y_2
60.	$ y_1 $	$ y_2 $



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Online lesson quiz at
www.PHSchool.com
 Web Code: afa-1201

Short Response

61. A point is reflected in the line $y = x$. Its image is in Quadrant III. In which quadrant is the preimage? Explain.

Mixed Review

Lesson 11-6

62. Write an equation for the locus: The points equidistant from $(1, 4)$ and $(5, -2)$.

Lesson 10-8



63. **Sports Equipment** The circumference of a softball is 12 in. and the circumference of a field hockey ball is 9 in.

- Find the similarity ratio of the softball to the field hockey ball.
- Find the ratio of the volumes: softball to field hockey ball.

Lesson 8-1



64. **Maps** A map of Alberta, Canada, is drawn to the scale $1 \text{ cm} = 25 \text{ km}$. On the map, the distance from Calgary to Edmonton is about 11.1 cm.

- About how far apart are the two cities?
- If $1 \text{ km} = 0.62 \text{ mi}$, about how many miles apart are the cities?